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ABSTRACT

A study investigated whether predictions of reading achievement could be improved by studying the relative contributions of alphabetic knowledge and invented spelling over time. Subjects, 38 upper middle-class children enrolled at an elementary school in the Midwest, were administered an alphabetic knowledge task (measuring letter names and letter sounds) and a measure of spelling ability twice during the kindergarten year. Two years later, grade equivalent scores from the reading comprehension subtest of the Iowa Test of Basic Skills were acquired. Results indicated that: (1) knowledge of the names and sounds of letters continued to be a good indicator of later reading success throughout kindergarten; (2) the combined variable of alphabetic knowledge yielded a more powerful midyear prediction of reading performance than either of the individual variables alone; and (3) by the end of kindergarten, children's invented spelling was found to provide the best prediction of subsequent reading success. (Two tables of data are included; 22 references are attached.) (RS)

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Reading Achievement: Contributions of
Invented Spelling and Alphabetic Knowledge

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Reading Achievement: Contributions of Invented Spelling and Alphabetic Knowledge

Important predictions about reading achievement have been learned by investigating children's knowledge of written language. Researchers have examined many 'parts' of beginning reading to determine what might predict subsequent reading success. Prereaders' explicit knowledge of letter names and sounds has long been noted to provide the best prediction of reading achievement (Ehri, 1983; Kontos, 1988; Richgels, 1986; Nevins, 1972). Mastery of letter knowledge was noted to distinguish between preschoolers who could read isolated words and those who could not (Masonheimer, et al., 1984). From this premise, several authors propose that beginning readers must have at least partial knowledge of letter names and sounds in order to shift from a visual processing to a more sophisticated, phonetic processing of words (Chall, 1983; Mason, 1980; Gough & Hillinger, 1980; Ehri & Wilce, 1985). Therefore, it would seem prudent that investigators who wish to optimize predictions of reading achievement, include assessments of young children's alphabetic knowledge.

Researchers have also begun to examine children's early spelling attempts to predict later reading success (Morris & Perney, 1984; Roper/Schneider, 1983; Shanahan, 1984). Beginning with a seminal study, Read (1971) examined preschoolers' early spelling development. He noted that young children's spelling attempts were surprisingly uniform and appeared to reflect a tacit understanding of phonological analysis. Children having only partial knowledge of letter names and sounds could produce spellings that represented approximations of words. Hence, although invented spelling shares some knowledge with letter names and sounds, assessments appear to reveal children's understanding of an additional concept of written language, the ability to segment words into abstract sounds.

Mann, Tobin and Wilson (1987) investigated the invented spellings of kindergarten children and reported that these productions reflect children's awareness of phonological structure. Other authors agree

(Chomsky, 1979; Ehri & Wilce, 1985), in order for children to construct invented spellings they must be able to segment the sounds in a word.

In 1984, Morris and Perney reported that assessments of children's invented spelling provided impressive predictions of later reading achievement. Using an 18-item spelling test, an analyses of first-graders' developmental spelling attempts yielded correlations that ranged from .61 to .74 with end of the year reading achievement. The authors concluded that teachers should analyze children's invented spellings to gain valuable information about their reading development. However, although their findings were impressive, relatively short periods of time elapsed between administering the predictor and criterion (i.e., 8 months and 5 months). In contrast, Kontos (1988) and Allen, et al., (1989) in their longitudinal studies of kindergarten children suggested that the relationship between reading and spelling was important only when the tests were measured concurrently.

Recently, this argument was examined further by the current author (Robinson, 1990). Kindergartners' knowledge of selected language concepts, that included invented spelling, were investigated over a period of two years. Assessments of invented spelling were collected twice during the kindergarten year. Scores on a standardized reading test were acquired two years later, allowing for a 16 and 23 month time lapse between predictors and criterion. Results indicated that invented spelling provided a substantial prediction after 16 months ($r = .65$) and 23 months ($r = .50$). The author suggested that assessment of invented spellings among kindergartners provides a strong prediction of later reading achievement, even when 16 months has elapsed between administering the predictor and criterion.

Therefore, it appears that as single predictors, children's ability to produce invented spelling and their explicit knowledge of alphabetic letters hold important relationships with reading achievement. Nonetheless, few studies have attempted to optimize predictions of reading success by examining the contributions of these variables, concurrently. Hence, the purpose of this paper was to

determine, through a further analysis of the data, whether predictions of reading achievement could be improved by studying the relative contributions of alphabetic knowledge and invented spelling over time.

Method

In the original study (Robinson, 1990), kindergartners' knowledge of five language variables were assessed, specifically, letter names, letter sounds, concept of a word, invented spelling, and phonemic awareness. The assessments were administered twice during the kindergarten year, once, in January and again, in June. Overall, the three best predictors of second grade reading achievement were kindergartners' knowledge of letter sounds (.76, .48), letter names (.72 and .77) and invented spelling (.50 and .65).

To conduct the analysis reported in this paper, scores from children's knowledge of letter names and letter sounds were combined to form a new variable, alphabetic knowledge. Theoretically, this new variable measures a construct that reflects children's rich network of associations with alphabetic letters. Intercorrelations (.62 and .56) indicated that letter names and sounds may share some of the same knowledge. However, procedurally, this practice allowed the author to retain a reasonable balance between sample size ($N=38$) and independent variables, required for investigations involving multiple regression. Therefore, two variables, alphabetic knowledge and invented spellings could be examined to determine how well they contribute to predictions of subsequent reading achievement.

Subjects- Thirty-eight children currently enrolled at one elementary school in the Midwest participated in the study. Initiated two years ago, the study drew students from three intact kindergarten classrooms (1/2 day programs). Today, the 38 subjects are enrolled in three different second grade classrooms. The group is comprised of 18 females and 20 males. Students represent an upper middle-class socioeconomic stratum in the community. Only children who speak English as their primary language were selected to participate in this study.

Several years ago the children's elementary school adopted a whole language program. Accordingly, the subjects in this study have experienced 30-40 minutes of writing daily since kindergarten. Children have also been encouraged to use invented spelling in their written productions. Mini-lessons on beginning reading skills have also been apart of the school's language program. All classrooms display an abundance of print produced primarily by children (e.g., stories, labels, etc.).

Procedure- An alphabetic knowledge task and a measure of spelling ability were individually administered to subjects, twice, during the kindergarten year. In January and again in June, kindergartners were assessed in their knowledge of 1) the names and sounds of letters, and 2) the sophistication of their spelling attempts. Two years later, grade equivalent scores from the reading comprehension subtest of the Iowa Test of Basic Skills were acquired.

Materials- Alphabetic knowledge of letter names and sounds was measured by asking children to identify the names and sounds of lower case letters presented individually on 3 x 5 cards. One point was scored for each correct response (total points=50). The letters 'x' and 'q' had been eliminated from the list of letter sounds, resulting in a total of 24 letter sounds.

Spelling ability was measured using a modified version of a task developed by Kontos and Mackey (1985). Children were read seven utterances (each a word, phrase or short sentence), and asked to "write down on paper in any way that will help you to remember them". Each of the seven items were scored from zero to eight (total points=56) for sophistication of spelling productions using criteria suggested by Clay (1975). Two teachers trained in evaluating the invented spellings, independently judged the writing samples and awarded scores with an inner-rater reliability of .76 (January testing) and .80 (June testing).

Reading achievement was measured by acquiring scores from the reading comprehension subtest of the Iowa Test of Basic Skills

(Hieronymus, et al., 1978). School personnel administered the exam in October of the subjects' second grade, as part of the school district's regular assessment program. National grade equivalent scores from the reading comprehension subtest of Form 7 were used. The primary battery consists of three sections and, according to the teacher's guide, assesses understanding of factual details and relationships such as cause and effect, traits and feelings, motives, and information leading to conclusions. Some questions assess the ability to understand the main idea and apply information through generalization.

Analysis- A new variable, alphabetic knowledge, was created by combining children's scores on tasks measuring letter names and letter sounds. Frequencies and correlations among all variables were calculated for both the January and June testing sessions. A step-wise multiple regression was used to develop reading achievement equations.

Results

Table 1 shows the means and standard deviations from assessments conducted in January and June among the 38 kindergartners. Children showed notable gains in both alphabetic knowledge and spelling performance over this five month period; improvements were statistically significant ($p < .01$).

Table 2 illustrates that correlation coefficients between reading achievement and the two predictors were also statistically significant ($p < .01$). The magnitude of the relationships indicated that at the January assessment, alphabetic knowledge (alphabet1) was the strongest predictor, but by the June assessment, spelling ability (spelling2) provided the best prediction. Inter-correlations between the two predictors ranged from .59 (January) to .48 (June).

Regression analyzes from the January testing, indicated that invented spelling did not contribute to the prediction of reading achievement after alphabetic knowledge of letter names and sounds had been considered ($F(1, 36) = 20.28, p < .01$). Kindergartners' knowledge of the names and sounds of the alphabet accounted for 67% of the variance in reading achievement ($R = .82$). However, five months

later, at the June testing, the null hypothesis was rejected at the .01 level of significance ($F(1,36) = 20.28, p < .01$). The analysis revealed that assessing kindergartners' invented spellings provided the best predictor of reading achievement, accounting for 42% of the variation ($R = .65$). Knowledge of letter names and sounds also contributed to the prediction accounting for an additional 12%. Therefore, invented spelling and alphabetic knowledge accounted for 54% of the variance in reading achievement ($R = .73$). The best prediction equation at the end of the kindergarten year was: reading achievement = $3.32 \text{ invented spelling} + 2.43 \text{ alphabetic knowledge} + 195.18$.

Discussion

The objective of the current study was to investigate if a prediction of reading achievement could be optimized by examining, over time, the contributions of kindergartners' alphabetic knowledge and their ability to construct invented spellings. Previous research had documented the important predictive qualities of letter names, letter sounds and invented spelling with reading success (e.g., Chall, 1983; Morris & Perney, 1984). The correlations reported in this paper were nonetheless, impressive, particularly considering the extended lapse of time between administering the predictors and the criterion, as well as, the homogeneous makeup of the sample who participated in this study.

Evidence showed that knowledge of the names and sounds of letters continues to be a good indicator of later reading success throughout kindergarten. This was particularly true, however, for the first testing in January in which alphabetic knowledge accounted for 67% of the variance in reading achievement. In an earlier report (Robinson, 1990) the variable, alphabetic knowledge, was not examined. For theoretical and procedural reasons the alphabetic knowledge variable was formed to allow an examination of the construct of children's knowledge of multiple associations with letters. It should be noted that this combined variable measuring children's knowledge of both letter names and sounds yielded a more powerful midyear prediction of

reading performance than either of these individual variables had reportedly been able to do alone (Robinson, 1990).

Furthermore, even at the end of the year, children's knowledge of alphabetic letters continued to contribute to the prediction of reading success. Perhaps, some sensitivity was lost in combining the variables of letter names and sounds; particularly at the June assessment. However, overall, the analyses indicated that the combined assessment of children's associations of letters, specifically names and sounds, provided a significant contribution to reading achievement throughout kindergarten. Therefore, further research that examined other linguistic associations that children link with letters (i.e., identifying words that start with a letter sound) might further increase the predictive quality of this variable.

Regarding assessments of kindergartners' invented spelling, only a moderate relationship with reading achievement was reported at the January testing. More importantly, this ability did not contribute to reading achievement once children's knowledge of letters was considered. Therefore, in the initial stages of reading acquisition, when most kindergartners are involved in visual processing of written language, an inquiry of letter names and sounds will provide the best prediction of later reading achievement. Furthermore, an additional assessment of kindergartners' invented spelling is not likely to contribute significantly to predictions of subsequent reading performance.

Nevertheless, by the end of kindergarten, assessments of children's invented spellings provide an entirely different picture. By the end of kindergarten, children's ability to produce spellings was found to provide the best prediction of subsequent reading success, even after a period of almost a year and a half. This delayed contribution of invented spelling in predicting reading, might support the notion that most kindergartners do not produce phonetic spellings until late in the year. By analyzing spelling scores in this study, few children by midyear of kindergarten, could construct spellings that

represented approximations of words. However, by the end of the year, all but one kindergartner was able to produce forms of invented spelling.

This finding may help explain the conflict noted among authors who have studied the reading-spelling relationship. Morris and Perney (1984), as cited earlier in this paper, reported strong correlations with reading achievement from analyses of first-graders' spelling productions. However, these correlations were acquired over relatively short periods of time (i.e., 5 months and 8 months). Other authors, as also mentioned (Allen, et al., 1989; Kontos, 1988), indicated that the magnitude of the relationship between reading and spelling became only important when the tests were administered at about the same time. Conversely, in this paper it was reported that even after a period of 16 months, analysis of children's invented spelling provided a substantial prediction of reading performance.

Therefore, this evidence would raise issue with those who suggest that high correlations between spelling and reading are a result of the length of time that transpires between predictor and criterion. Rather, it is argued by this author that these impressive correlations reflect a shared knowledge between reading and invented spelling that occurs only when assessments are delayed until children are capable of constructing phonetic spellings.

Pursuing this argument further, Morris and Perney (1984) found strong correlations not because of the short period of time between the predictor and criterion, but because their assessments involved children in first-grade. First-graders could produce spellings that resemble conventional words. Not surprisingly, in the studies by Allen et al., (1989) and Kontos (1988) that examined the invented spellings of kindergartners, the authors did not find even moderately strong correlations until the end of the kindergarten year. Similarly, the findings reported in this paper seemed to indicate that even among upper-middle class kindergartners, enrolled in a whole language program, spellings productions are not sophisticated enough, before the

end of kindergarten, to contribute to predictions of reading achievement.

Therefore, from a practical standpoint, although authors (e.g., Morris & Perney, 1984; Sulzby & Teale, 1985) have recommended that teachers analyze children's early spelling attempts to acquire insights about reading development, a caveat may exist. When kindergartners initially attempt to use print, the information gleaned from analyses of their written productions may be questionable. This argument corroborates the concerns that have been expressed by other authors (e.g., Huba & Robinson, 1987; Robinson, Parkinson, & Forrest, 1989); early spelling productions of preprimary age children may not accurately reflect their knowledge of written language.

This reservation in assessing kindergartners' invented spellings may be tempered by a limitation of the current study. Because predictions of reading achievement were determined by analyzing samples of children's invented spelling on only two occasions, it might be argued that kindergartners' maximal spelling ability was never adequately evaluated. This may be true. However, in Barnhardt and Sulzby's study (1986) kindergartners used the most advanced forms of spelling when asked to spell short phrases or single words. In the spelling task used in the present study, children were asked to write down seven utterances that were dictated to them by the examiner. These seven utterances used only individual words or short phrases (e.g., cat, spooky ghost, etc.). Therefore, it could be argued that a maximum performance was acquired from the 38 kindergartners on the invented spelling task used in this study.

In conclusion, the data support and extend the findings reported by other researchers (e.g., Chall, 1983; Kontos, 1988; Morris and Perney, 1984). Strong predictions of reading success can be acquired through midyear assessments that are limited to measuring kindergartners' alphabetic knowledge. However, by conducting an end of the year assessment of both kindergartners' ability to construct invented spellings and their knowledge of the names and sounds of

letters, predictions of reading achievement can be optimized.

References

- Allen, J. (1989). Reading and writing development in whole language kindergartens. In J. Mason (Ed.), Reading and Writing Connections. Needham Heights, MA: Allyn and Bacon, 124 -145.
- Barnhardt, J. E., & Sulzby, E. (1986). How Johnny can write: Children's uses of emergent writing systems. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.
- Chall, J. S. (1983). Stages of reading development. New York: McGraw-Hill.
- Chomsky, C. (1979). Approaching reading through invented spelling. In L. B. Resnick & P. A. Weaver (Eds), Theory and practice of early reading (Vol.2, 43-65). Hillsdale, NJ: Erlbaum.
- Ehri, L. C. (1983). Summaries and a critique of five studies related to letter-name knowledge and learning to read. In L. Gentile, M. Kamil, & J. Blanchard (Eds.), Reading research revisited. Columbus, OH: Merrill.
- Ehri, L. C. and Wilce, L. S. (1985). Movement into reading: Is the first stage of printed word learning visual or phonetic? Reading Research Quarterly, 20, 163-179.
- Gough, P. B., & Hillinger, M. L. (1980). Learning to read: An unnatural act, Bulletin of the Orton Society, 30, 180-196.
- Hieronymus, A. N., Lindquist, E. F., & Hoover, H. D. (1978). Iowa tests of basic skills. Iowa City, IA: University of Iowa.
- Huba, M. E., & Robinson, S. S. (1987). Examining the correlates of reading ability among preschoolers. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Kontos, S. (1988). Development and interrelationships of reading knowledge and skills during kindergarten and first grade. Reading Research and Instruction, 27(2), 13-28.
- Mann, V. A., Tobin, P., and Wilson, R. (1987). Measuring phonological awareness Through the Invented spellings of kindergarten children. Merrill-Palmer Quarterly, 33(3), 365-391.
- Mason, J. (1980). When do children begin to read: An exploration of four-year-old children's letter and word reading competencies. Reading Research Quarterly, 15, 203-227.
- Masonheimer, P. E., Drum, P. A., and Ehri, L. C. (1984). Does environmental print identification lead children into word reading? Journal of Reading Behavior, 16, 257-271.
- Morris, D., and Perney, J. (1984). Developmental spelling as a predictor of first-grade reading achievement. Elementary School Journal, 84, 441-457.
- Nevins, R. V. (1972). The effect of training in letter names, letter sounds, and letter names and sounds on the acquisition of word recognition ability. Unpublished doctoral dissertation, State University of New York at Albany.
- Read, C. (1971). Pre-school children's knowledge of English phonology. Harvard Educational Review, 41, 1-34.

- Richgels, D. J. (1986). An investigation of preschool and kindergarten children's spelling and reading abilities. Journal of Research and Development in Education, 19(4), 41-47.
- Robinson, S. S., Parkinson, J., & Forrest, L. G. (1989). Reading and spelling development among kindergartners. Paper presented at annual meeting of the National Reading Conference, Austin, TX.
- Robinson, S. S. (1990). Developmental spelling and other language predictors of reading achievement. Paper presented at the annual meeting of the National Reading Conference, Miami Beach, FL.
- Roper/Schneider, D. (1983) . Spelling as an independent skill and in its relationship to reading. Paper presented at annual meeting of the National Reading Conference, Austin, TX.
- Shanahan, T. (1984). Nature of the reading-writing relation: An exploratory multivariate analysis, Journal of Educational Psychology, 76, 466-477.
- Sulzby, E. and Teale, W. H. (1985). Writing development in early childhood. Educational Horizons, 64, 8-12.

TABLE 1. Means and standard deviations for alphabetic knowledge and spelling ability among kindergartners (N=38)

	<u>January</u>		<u>June</u>		
	M	SD	M	SD	t
Alphabetic Knowledge	37.79	7.54	43.03	4.75	-6.09**
(max=50)					
Invented Spelling	37.26	9.08	45.58	4.09	-6.57**
(max=56)					

**p < .01

TABLE 2. Correlations among predictors and criterion (N=38)

	Reading test	Alphabet1	Alphabet2	Spelling1	Spelling2
Reading test	1.00	.82**	.60**	.50**	.65**
Alphabet1	.82**	1.00	.72**	.59**	.72**
Alphabet2	.60**	.72**	1.00	.41**	.48**
Spelling1	.50**	.59**	.41**	1.00	.52**
Spelling2	.65**	.72**	.48**	.52**	1.00

** p< .01